USPTO Customer No. 25280 Case No. 5602

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: Wang et al.

Serial Number: 10/785,445

Filed: February 24, 2004

For: **TREATED TEXTILE SUBSTRATE AND METHOD FOR MAKING A TEXTILE SUBSTRATE**

Group Art Unit: 1794

Examiner: Matzek, Matthew D.

BRIEF ON APPEAL UNDER 37 CFR 1.192

Commissioner for Patents
PO Box 1450
Alexandria, Virginia 22313-1450

Sir:

CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 C.F.R. § 1.6(d)
I hereby certify that this correspondence is being transmitted by facsimile to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, at (571) 273-8300.
Date: August 6, 2009
Signature: Melody Towery
Name: Melody Towery

The following Appeal Brief is submitted pursuant to the Notice of Appeal dated June 9, 2009.

I. REAL PARTY IN INTEREST

The above-referenced application is the subject of an assignment to Milliken & Company, located at 920 Milliken Road, Spartanburg, South Carolina, which is the real party in interest.

II. RELATED APPEALS & INTERFERENCES

Appellants are not aware of any other appeal or interference that will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 6 – 7, 28 – 31 and 34 – 39 have been cancelled. Claims 1 – 5, 8 – 27, 32, 33 and 40 – 45 are rejected and are the subject of this Appeal.

IV. STATUS OF AMENDMENTS

No amendment was filed after the Final Office Action dated March 9, 2009.

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V. SUMMARY OF CLAIMED SUBJECT MATTER

The subject application is directed to compositions and methods for treating textile substrates to obtain superior liquid repellent properties.

Claim 1 is directed to a fiber-containing substrate with a first surface and a second surface having integral microscopic surface structures on at least a portion of one of its surfaces, wherein the surface structures have projections substantially normal to the plane of the fiber-containing substrate, and wherein the surface is comprised of (a) portions having a plurality of substantially unbroken fibers comprising surface structures along at least part of the length of the fibers, and wherein the fibers have a Roughness Factor greater than or equal to about 1.10 and (b) a repellent component selected from fluorocarbon-containing chemicals, silicones, waxes and combinations thereof, and wherein the integral microscopic surface structures are achieved through exposure of the fiber-containing substrate to mechanical face-finishing which utilizes diamond grit having an average grit size of from about 600 to about 1200.

The features of Claim 1 are described, for example, in the specification on page 13 (lines 16-18), on page 14 (line 15) to page 15 (line 8), on page 17 (line 11) to page 18 (line 5), on page 20 (lines 6-21), on page 30 (lines 8-10), in Example 20 (pages 54-55), and in Table 1D (page 70).

Claim 32 is directed to a fiber-containing substrate with a first surface and a second surface having integral microscopic surface structures on at least a portion of one of its surfaces, wherein the surface structures have projections substantially normal to the plane of the fiber-containing substrate, and wherein the surface is comprised of (a) portions having a plurality of substantially unbroken fibers comprising surface structures along at least part of the length of the fibers, and the fibers have a Roughness Factor greater than or equal to about 1.10, (b) a repellent component selected from fluorocarbon-containing chemicals, silicones, waxes and combinations thereof, and (c) a particulate component, and wherein the integral microscopic surface structures are achieved through exposure of the fiber-containing substrate to mechanical face-finishing which utilizes diamond grit having an average grit size of from about 600 to about 1200.

The features of Claim 32 are described, for example, in the specification on page 13 (lines 16-18), on page 14 (line 15) to page 15 (line 8), on page 17 (line 11) to page 18 (line 5), on page 20 (lines 6-21), on page 21 (lines 9-11), on page 22 (lines 3-8), on page 30 (lines 8-10), on page 30 (line 17) to page 33 (line 22), in Example 20 (pages 54-55), and in Table 1D (page 70).

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Claim 40 is directed to a composite textile substrate comprising (I) at least one layer of a fiber-containing substrate with a first surface and a second surface having integral microscopic surface structures on at least a portion of one of its surfaces, wherein the surface structures have projections substantially normal to the plane of the fiber-containing substrate, and wherein the surface is comprised of (a) portions having a plurality of substantially unbroken fibers comprising surface structures along at least part of the length of the fibers, and the fibers have a Roughness Factor greater than or equal to about 1.10 and (b) a repellent component selected from fluorocarbon-containing chemicals, silicones, waxes and combinations thereof, and wherein the integral microscopic surface structures are achieved through exposure of the fiber-containing substrate to mechanical face-finishing which utilizes diamond grit having an average grit size of from about 600 to about 1200; and (II) at least one additional layer of material selected from fiber-containing substrates, films, coatings, foams, reinforcing substrates, and adhesives.

The features of Claim 40 are described, for example, in the specification on page 13 (lines 16-21), on page 14 (line 15) to page 15 (line 8), on page 17 (line 11) to page 18 (line 5), on page 20 (lines 6-21), on page 30 (lines 8-10), in Example 20 (pages 54-55), and in Table 1D (page 70).

Claim 44 is directed to a composite textile substrate comprising (I) at least one layer of a fiber-containing substrate with a first surface and a second surface having integral microscopic surface structures on at least a portion of one of its surfaces, wherein the surface structures have projections substantially normal to the plane of the fiber-containing substrate, and wherein the surface is comprised of (a) portions having a plurality of substantially unbroken fibers comprising surface structures along at least part of the length of the fibers, and the fibers have a Roughness Factor greater than or equal to about 1.10, (b) a repellent component selected from fluorocarbon-containing chemicals, silicones, waxes and combinations thereof, and (c) a particulate component, and wherein the integral microscopic surface structures are achieved through exposure of the fiber-containing substrate to mechanical face-finishing which utilizes diamond grit having an average grit size of from about 600 to about 1200; and (II) at least one additional layer of material selected from fiber-containing substrates, films, coatings, foams, reinforcing substrates, and adhesives.

The features of Claim 44 are described, for example, in the specification on page 13 (lines 16-21), on page 14 (line 15) to page 15 (line 8), on page 17 (line 11) to page 18 (line 5), on page 20 (lines 6-21), on page 21 (lines 9-11), on page 22 (lines 3-8), on page 30 (lines 8-10), on page 30 (line 17) to page 33 (line 22), in Example 20 (pages 54-55), and in Table 1D (page 70).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

(A) Claims 1-5, 8-27, 32 and 33 stand rejected under 35 USC Section 103(a) as being obvious over Otto (US Patent No. 4,316,928) in view of Nun et al. (US Patent Application Publication 2003/0013795).

(B) Claims 40-45 stand rejected under 35 USC Section 103(a) as being obvious over Otto (US Patent No. 4,316,928) in view of Nun et al. (US Patent Application Publication 2003/0013795) and further in view of Morrison (US Patent No. 4,343,853).

VII. ARGUMENT

A. Claims 1-5, 8-27, 32 and 33 stand rejected under 35 USC Section 103(a) as being obvious over Otto (US Patent No. 4,316,928) in view of Nun et al. (US Patent Application Publication 2003/0013795).

The Office states that Otto teaches a method of making a fiber-containing substrate, including steps of providing a fiber-containing substrate (10) having a first surface and a second surface (Figure 1), and face finishing at least the first surface of the substrate. The face finishing is a mechanical treatment of the substrate, accomplished by exposing at least the first surface of the substrate to one or more abrasive surfaces (11, 11a). The process of Otto provides a substantially uniform modification to the surface of the fabric (Abstract). A uniform modification of the surface of the fabric results in greater than 20% of said surface being treated. A wide variety of fabrics may benefit from being processed according to Otto including woven, knitted, and nonwoven fabrics (col. 6, lines 25-30). The face finishing forms integral microscopic surface structures, as in claim 1 (col. 3, lines 19-59; col. 6, lines 53-54, disclosing that the finish is not apparent to the naked eye; Figures 9 and 17, showing 350x magnification of the surface).

Furthermore, the Office asserts that the substrate of Otto has integral microscopic surface structures including projections (see protrusions disclosed in col. 3, lines 22-25) and the method of abrading disclosed by Otto would clearly result in the fabric having a roughened surface. Example 1 looked at under magnification has filaments broken to some extent but are predominantly extensively modified by the formation of lamella shaped protrusions on the fiber surfaces and by the formation of scar type surface modifications on the fiber surfaces. The Gessner-sanded samples by contrast show a substantial number of cut and broken fibers with only very minor modifications of the surface characteristics of the individual fibers. The current claims recite "portions having a plurality of substantially unbroken fibers" and as such the Office takes the position that since Example 1 only has some broken filaments, there would necessarily be portions of the surface of the article containing a plurality of substantially unbroken fibers, thereby meeting the claim. Furthermore, the applied reference explicitly teaches the surface of the treated fabric has "few broken fibers although it may be characterized as having a very soft touch" (col. 2, lines 7-11). This teaching clearly provides for the claimed "portions having a plurality of substantially unbroken fibers."

The Office also states that Otto discloses the use of sanding paper of grit size of about 600 (col. 8, lines 18-25) as abrasive means in process that would form integral microscopic surface structures. The Office takes the position that since abrasive means with common grit size are used by Applicant and Otto the two processes would form the same integral microscopic surface structures.

The Office states that Otto fails to teach the use of a repellent component or the addition of small particles.

The Office states that Nun et al. teach a self-regenerating, self-cleaning hydrophobic surface formed when particles are secured on a carrier that is itself a mixture of particles and binder (Abstract). Elevations and depressions are formed by particles being secured to the surface by the carrier [0030]. The preferred size of the particles range from 20 nm to 100 microns [0031]. The distance between adjacent particles on the surface ranges from 0 to 10 particle diameters [0032] (*should be paragraph 0033*). The particulate may be silica including fumed silica [0035]. The binding carrier that coats the surface of the article may be cross-linked [0040] and may comprise acrylates or urethane acrylates. The Office further states that it can be advantageous

for the binding polymer to comprise compounds having fluorine-containing groups such as perfluorinated acrylic esters. The particles may be applied to fabrics for use as umbrellas [0065].

Thus, the Office asserts that since Otto and Nun et al. are from the same field of endeavor (i.e. treated fabrics), the purpose disclosed by Nun et al. would have been recognized in the pertinent art of Otto. As such, the Office states that it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the invention of Otto with the coating motivated by creating a self-cleaning, hydrophobic fabric as disclosed by Nun et al.

Although Otto and Nun et al. do not explicitly teach the claimed Roughness Factor and integral microscopic structure size, the Office believes it is reasonable to presume that said property and structure is inherent to the combined invention. Support for said presumption is found in the use of like materials (mechanically surface-finished textile that requires 350x magnification to view the protrusions). The burden is upon Applicant to prove otherwise.

The Office contends that Otto provides a broad teaching as to the fabrics that may be surface-finished. This teaching is interpreted by the Office to include all conventional fabrics including a laid scrim.

In order to establish a *prima facie* case of obviousness, MPEP 2143 states that (a) there must be a motivation or suggestion to combine [or modify] the references, (b) there must be a reasonable expectation of success if the combination or modification is made, and (c) all the claim limitations must be considered. Appellants respectfully submit that all of (a) – (c) have not been met; and therefore, the instant claims are not obvious in light of the prior art.

Case law supports this statement in that the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Additionally, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggest the desirability of the combination. *In re Mills*, 916 F.2d 860, 16 USPQ2d 1430, 4132 (Fed. Cir. 1990).

With respect to consideration of all the claim limitations, the claims of the present invention include the limitation that the fiber-containing substrate contains integral microscopic surface structures, as a result of exposing the substrate to a mechanical face-finishing process that utilizes diamond grit having a size of 600 to 1200. In contrast, the Otto reference teaches mechanical face-finishing of textile fabrics via the use of sanding paper having attached thereto grit in the size range of from about 16 to about 600. More specifically, Otto states (col. 8, lines 18-22):

> Where the abrasive means is sanding paper, the grit of the sanding paper may vary widely, with grit sizes of about 16 to about 600, preferably between about 80 and about 400, e.g. about 180 to about 320 being appropriate.

See also the Table provided by Otto (col. 17 and 18) which illustrates that the grit size of the sanding paper used in all the Examples was 240. In contrast, Appellants claim the use of diamond grit in the size range of from about 600 to about 1200. Otto fails to teach the use of diamond grit. Nun fails to teach mechanical face-finishing, and thus, fails to teach the use of any abrasive means. Accordingly, Appellants respectfully submit that the combination of Otto in view of Nun fails to consider all of the limitations of the present claims. As such, Appellants respectfully submit that the instantly claimed invention is not taught or fairly suggested by the combination of Otto in view of Nun, and thus, is not an obvious variation of the prior art references.

Additionally, Appellants point out that they are very familiar with the Otto reference, since the Otto reference is assigned to Milliken Research Corporation, which is a wholly owned subsidiary of Milliken & Company. The instant pending application is assigned to Milliken & Company. The Otto process is known to result in a treated textile substrate that contains many broken fibers. Appellants point specifically to Examples 1, 3, 7 and 12 of Otto, which provide a description of broken and/or cut fibers after exposure to the Otto process.

Thus, Appellants respectfully assert that this feature of Appellants' claims – that is, "having a plurality of substantially unbroken fibers" – has not been properly considered by the Office, as required by MPEP 2143. With regard to the Figures of Otto, which the Office relies upon to illustrate unbroken fibers, Appellants respectfully submit that they are difficult to view. Appellants cannot determine whether broken fibers or unbroken fibers are present by looking at the Figures

of Otto. Thus, Appellants rely on the discussion of the test results provided by Otto in the Examples section.

The discussion of test results provided by Otto clearly discloses the presence of broken fibers (see Examples 1, 3, 7 and 12 and discussion of Figures 8 – 9, 15 – 17, 35 – 36, 45 – 46). More specifically, with respect to Example 1, Otto states (col. 10, lines 27-29):

> ...the fibers of the fabric of the present invention are broken to some extent...

Otto also states that there are cut fibers present on the surface in Examples 3, 7 and 12. Appellants respectfully assert that one cannot determine whether there are any uncut fibers present on the surface of the treated substrate, as taught by Otto.

Thus, Appellants respectfully submit that Otto "having a plurality of substantially unbroken fibers," as recited by the instant claims. Nun further fails to teach this limitation. Accordingly, Appellants respectfully submit that the combination of Otto in view of Nun fails to consider all of the limitations of the present claims. As such, Appellants respectfully submit that the instantly claimed invention is not taught or fairly suggested by the combination of Otto in view of Nun, and thus, is not an obvious variation of the prior art references.

With respect to motivation to combine, Appellants respectfully disagree with the Office's assertion that Otto and Nun et al. are from the same field of endeavor (i.e. treated fabrics) and therefore, the purpose disclosed by Nun et al. would have been recognized in the pertinent art of Otto. Accordingly, Appellants disagree with the Office's reasoning in that it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the invention of Otto with the coating motivated by creating a self-cleaning, hydrophobic fabric as disclosed by Nun et al.

Appellants respectfully submit that Nun et al. fail to teach treating fiber-containing substrates, as asserted by the Office. The only mention of something remotely close to such substrates is the disclosure by Nun et al. that their process may be used [0065]:

> ...for producing self-cleaning surfaces with a self-regenerating self-cleaning effect on non-rigid surfaces of articles, e.g. umbrellas or on other surfaces required to be flexible.

Appellants respectfully submit that such disclosure does not constitute a teaching or suggestion of treating fiber-containing substrates as asserted by the Office.

Thus, Appellants respectfully submit that since Nun fails to teach any fiber-containing substrates, there is no reasonable basis for combining Nun with Otto and asserting that the instant claims are an obvious variation over the teachings of this combination of references.

Therefore, Appellants respectfully submit that there is no motivation, or apparent reason, to combine Otto with Nun, since (a) Otto fails to teach or suggest the need for any further fabric treatments after the mechanical face-finishing of the fabric and (b) Nun fails to teach the treatment of fiber-containing substrates and thus fails to teach or suggest any mechanical face-finishing treatments for such substrates. As such, Appellants respectfully submit that one having ordinary skill in the art at the time the invention was made would not be motivated to combine the particle-containing coating for non-fiber containing substrates, as taught by Nun, with the mechanical face-finishing treatments for fabrics, as taught by Otto.

With respect to expectation of success, Appellants respectfully submit that, even if the combination were properly made, there is no reasonable expectation of success that modifying the substrates taught by Otto with the chemical treatment taught by Nun would result in Appellants' claimed invention. Nun teaches applying the chemical treatment to smooth, rigid and non-rigid surfaces [0064-0065]. The rigid substrates taught by Nun would not be treatable by the processes of Otto because they could not be fed through the rotating cylinders of the mechanical face-finishing apparatus. The flexible substrates taught by Nun, if treated by the processes of Otto, would result in the undesirable removal of the chemical treatment taught by Nun, which would occur as the chemically-treated flexible substrates of Nun were fed through the mechanical face-finishing apparatus of Otto and exposed to the abrasive grit contained on the rotating cylinders of the apparatus.

Thus, Appellants respectfully submit that combining the teachings of Otto with Nun would destroy the intended function of the Nun invention by removing the particles applied to the substrate of Nun. As such, Appellants respectfully submit that there is no reasonable expectation, if the combination were properly made, that one having ordinary skill in the art would successfully combine the teachings of Nun with Otto and arrived at the instantly claimed invention.

Furthermore, with respect to the Office's assertion that Appellants' claimed Roughness Factor would be inherent in the combination of Otto and Nun, Appellants respectfully disagree. Appellants rely on the discussion provided above with regard to the differences between the present invention and the combination of references. Thus, Appellants respectfully submit that "like materials" are not taught or suggested by the combination of references, as asserted by the Office. Also, while Appellants would be willing to replicate Example 1 of Otto in combination with the chemical treatment of Nun, Appellants respectfully note that Otto fails to provide the details of the face-finishing process used to treat the double knit fabric of Example 1. For instance, the speed at which the fabric was treated is not disclosed, nor is the grit size of the sanding paper that was used. Broad ranges of these parameters are provided in columns 7 – 9, but the exact parameters used to create the face-finished fabric of Example 1 are not provided by the reference. Hence, Appellants respectfully submit that it would be improper to make such an inherency determination, since the Examples provided by Otto cannot be properly replicated.

Accordingly, Appellants respectfully submit that the combination of Otto in view of Nun et al. fails to provide a *prima facie* case of obviousness, since (a) there is no motivation or suggestion to combine the references, (b) there is no reasonable expectation of success, even if the combination is made, and (c) all claim limitations have not been considered, as required by MPEP 2143. Thus, reconsideration and withdrawal of this rejection is earnestly and respectfully requested.

B. Claims 40 – 45 stand rejected under 35 USC Section 103(a) as being obvious over Otto (US Patent No. 4,316,928) in view of Nun et al. (US Patent Application Publication 2003/0013795) and further in view of Morrison (US Patent No. 4,343,853).

The Office asserts that the disclosures of Otto and Nun et al. fail to teach the use of at least one additional layer of material. Thus, the Office relies upon the teachings of Morrison for a disclosure of a "two-face" fabric comprising a visible face fabric and a backing fabric (col. 2, lines 10-68). The Office states that the primary objective of the fabric is to create an article that is anti-microbial even though both fabric faces have not been treated (col. 3, lines 8-17).

Thus, the Office submits that since Otto and Morrison are from the same field of endeavor (i.e. treated fabrics), the purpose disclosed by Morrison would have been recognized in the pertinent art of Otto. As such, the Office states that it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the combined invention of Otto and Nun et al. with the second fabric layer of Morrison motivated by imparting anti-microbial protection to two fabric faces while maintaining the advantages of naturally occurring, untreated fibers in one of the fabrics (Abstract, Morrison).

In order to establish a *prima facie* case of obviousness, MPEP 2143 states that (a) there must be a motivation or suggestion to combine the references, (b) there must be a reasonable expectation of success if the combination is made, and (c) all the claim limitations must be considered. Appellants respectfully submit that all of (a) – (c) have not been met; and therefore, the instant claims are not obvious in light of the prior art.

Case law supports this statement in that the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Additionally, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggest the desirability of the combination. *In re Mills*, 916 F.2d 860, 16 USPQ2d 1430, 4132 (Fed. Cir. 1990).

Appellants respectfully rely on the discussion presented above with regard to the deficiencies of Otto in view of Nun et al. and respectfully assert that the additional teachings provided by Morrison fail to provide for these deficiencies. Morrison fails to teach mechanically face-finished fiber-containing substrates that comprise repellent compounds and particulate components having a Roughness Factor of equal to or greater than 1.10, as claimed by Appellants. Rather, Morrison teaches a multi-layered fabric having an antimicrobial agent contained therein (Abstract; col. 2, lines 17). The antimicrobial agent is added to a polymer melt and an antimicrobial-containing fiber is extruded therefrom (col. 4, lines 4-18).

Accordingly, Appellants respectfully submit that the combination of Otto in view of Nun et al. and further in view of Morrison fails to provide a *prima facie* case of obviousness, since (a) there is no motivation or suggestion to combine the references, (b) there is no reasonable expectation of success, even if the combination is made, and (c) all claim limitations have not been considered, as required by MPEP 2143. Thus, reconsideration and withdrawal of this rejection is earnestly requested.

CONCLUSION

For the reasons set forth above, Appellants respectfully urge that the rejections of Claims 1 – 5, 8 – 27, 32, 33 and 40 – 45 are improper. Reversal of all rejections in this Appeal is hereby requested.

A copy of pending Claims 1 – 5, 8 – 27, 32, 33 and 40 – 45 is attached hereto in the Claims Appendix.

The Commissioner is hereby authorized to charge the fee of $540.00 to Deposit Account No. 04-0500. The Commissioner is also authorized to charge any additional fees that may be required, or credit any over-payment, to Deposit Account No. 04-0500.

Respectfully submitted,

August 6, 2009

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VIII. CLAIMS APPENDIX

1. A fiber-containing substrate with a first surface and a second surface having integral microscopic surface structures upon at least a portion of at least one of its surfaces, wherein said integral microscopic surface structures have projections substantially normal to the plane of said fiber-containing substrate, said at least one surface comprised of:
(a) portions having a plurality of substantially unbroken fibers comprising surface structures along at least part of the length of said fibers, and wherein said fibers have a Roughness Factor greater than or equal to about 1.10; and
(b) a repellent component selected from the group consisting of fluorocarbon-containing chemicals, silicones, waxes, and combinations thereof; and
wherein said integral microscopic surface structures are achieved through exposure of the fiber-containing substrate to mechanical face-finishing which utilizes diamond grit having an average grit size of from about 600 to about 1200.

2. The fiber-containing substrate of claim 1 wherein said integral microscopic surface structures have a size less than about 100 μm.

3. The fiber-containing substrate of claim 1 wherein said integral microscopic surface structures are present upon at least 10% of at least of one of its surfaces.

4. The fiber-containing substrate of claim 1 wherein said integral microscopic surface structures are present upon at least 15% of at least of one of its surfaces.

5. The fiber-containing substrate of claim 1 wherein said integral microscopic surface structures are present upon at least 20% of at least of one of its surfaces.

Claims 6 – 7 (cancelled)

8. The fiber-containing substrate of claim 1 wherein said repellent component is a fluorocarbon-containing chemical.

9. The fiber-containing substrate of claim 8 wherein said fluorocarbon-containing chemical is a fluoroacrylate-containing composition or a fluorourethane-containing composition.

10. The fiber-containing substrate of claim 1 wherein said fiber-containing substrate further comprises a crosslinking component upon said at least one surface.

11. The fiber-containing substrate of claim 10 wherein said crosslinking component is a polyurethane-based material.

12. The fiber-containing substrate of claim 1 wherein said fiber-containing substrate further comprises a particulate component upon said at least one surface.

13. The fiber-containing substrate of claim 12 wherein said particulate component comprises particles having an average particle size between about 1 nm and about 50 μm.

14. The fiber-containing substrate of claim 12 wherein said particulate component comprises particles having an average particle size between about 5 nm and about 1 μm.

15. The fiber-containing substrate of claim 12 wherein said particulate component comprises particles having an average particle size between about 10 nm and about 50 nm.

16. The fiber-containing substrate of claim 12 wherein said particulate component is comprised of at least one material selected from the group consisting of silicates, doped silicates, minerals, silicas, polymers, carbon, graphite, metal salts, metal powders, silica-coated metal powders, inorganic oxides, and combinations thereof.

17. The fiber-containing substrate of claim 16 wherein said particulate component is a silica-based material.

18. The fiber-containing substrate of claim 17 wherein said silica-based material is colloidal silica.

19. The fiber-containing substrate of claim 12 wherein said fiber-containing substrate further comprises a crosslinking component upon said at least one surface.

20. The fiber-containing substrate of claim 19 wherein said crosslinking component is a polyurethane-based material.

21. The fiber-containing substrate of claim 1 wherein said fiber-containing substrate further comprises a particulate component and a crosslinking component.

22. The fiber-containing substrate of claim 1 wherein said fibers have a Roughness Factor greater than or equal to about 1.20.

23. The fiber-containing substrate of claim 1 wherein said fibers have a Roughness Factor greater than or equal to about 1.30.

24. The fiber-containing substrate of claim 1 wherein said fiber-containing substrate comprises a woven fabric.

25. The fiber-containing substrate of claim 1 wherein said fiber-containing substrate comprises a non-woven fabric.

26. The fiber-containing substrate of claim 1 wherein said fiber-containing substrate comprises a knitted fabric.

27. The fiber-containing substrate of claim 1 wherein said fiber-containing substrate comprises a laid scrim.

Claims 28 – 31 (cancelled)

32. A fiber-containing substrate with a first surface and a second surface having integral microscopic surface structures upon at least a portion of at least one of its surfaces, wherein said integral microscopic surface structures have projections substantially normal to the plane of said fiber-containing substrate, said at least one surface comprised of:

(a) portions having a plurality of substantially unbroken fibers comprising surface structures along at least part of the length of said fibers, and wherein said fibers have a Roughness Factor greater than or equal to about 1.10;

(b) a repellent component selected from the group consisting of fluorocarbon-containing chemicals, silicones, waxes, and combinations thereof; and

(c) a particulate component; and

wherein said integral microscopic surface structures are achieved through exposure of the fiber-containing substrate to mechanical face-finishing which utilizes diamond grit having an average grit size of from about 600 to about 1200.

33. The fiber-containing substrate of claim 32 wherein said fiber-containing substrate further comprises a crosslinking component upon said at least one surface.

Claims 34 – 39 (cancelled)

40. A composite textile substrate comprising:

(I) at least one layer of a fiber-containing substrate with a first surface and a second surface having integral microscopic surface structures upon at least a portion of at least one of its surfaces, wherein said integral microscopic surface structures have projections substantially normal to the plane of said fiber-containing substrate, said at least one surface comprised of:

(a) portions having a plurality of substantially unbroken fibers comprising surface structures along at least part of the length of said fibers, and wherein said fibers have a Roughness Factor greater than or equal to about 1.10; and

(b) a repellent component selected from the group consisting of fluorocarbon-containing chemicals, silicones, waxes, and combinations thereof; and

wherein said integral microscopic surface structures are achieved through exposure of the fiber-containing substrate to mechanical face-finishing which utilizes diamond grit having an average grit size of from about 600 to about 1200; and

(II) at least one additional layer of material selected from the group consisting of fiber-containing substrates, films, coatings, foams, reinforcing substrates, and adhesives.

41. The composite textile substrate of claim 40 wherein said fiber-containing substrate further comprises a crosslinking component.

42. The composite textile substrate of claim 40 wherein said fiber-containing substrate further comprises a particulate component.

43. The composite textile substrate of claim 42 wherein said fiber-containing substrate further comprises a crosslinking component.

44. A composite textile substrate comprising:

(I) at least one layer of a fiber-containing substrate with a first surface and a second surface having integral microscopic surface structures upon at least a portion of at least one of its surfaces, wherein said integral microscopic surface structures have projections substantially normal to the plane of said fiber-containing substrate, said at least one surface comprised of:

(a) portions having a plurality of substantially unbroken fibers comprising surface structures along at least part of the length of said fibers, and wherein said fibers have a Roughness Factor greater than or equal to about 1.10; and

(b) a repellent component selected from the group consisting of fluorocarbon-containing chemicals, silicones, waxes, and combinations thereof; and

(c) a particulate component; and

wherein said integral microscopic surface structures are achieved through exposure of the fiber-containing substrate to mechanical face-finishing which utilizes diamond grit having an average grit size of from about 600 to about 1200; and

(II) at least one additional layer of material selected from the group consisting of fiber-containing substrates, films, coatings, foams, reinforcing substrates, and adhesives.

45. The composite textile substrate of claim 44 wherein said fiber-containing substrate further comprises a crosslinking component.

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IX. EVIDENCE APPENDIX

NONE.

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X. RELATED PROCEEDINGS APPENDIX

NONE.